Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

Listing of Claims

1   1.   (Currently Amended): A method of processing a command requesting

2   information on any intermediate layer-2 devices present in a route from a first system to

3   a second system, said any intermediate devices being contained in a network implemented

4   on a broadcast medium, said network containing a plurality of devices including said any

5   intermediate devices, said method comprising:

6   receiving said command;

7   determining a first layer-2 device which is connected directly to said first system,

8   logically viewing said first layer-2 device as a present layer-2 device if said second

9   system is also not directly connected to said first layer-2 device;

10   sending a request packet to said present layer-2 device requesting information on

11   whether said second system is connected directly to said ~~system~~ present layer-2 device;

12   receiving a response packet from said present layer-2 device, wherein said

13   response packet indicates whether said second system is connected directly to said

14   present layer-2 device, wherein said response packet further identifies a subsequent layer-

15   2 device in a route to said second system if said second system is not connected directly

16   to said present layer-2 device, wherein said subsequent layer-2 device is next to said

17   present layer-2 device in said route to said second system; and

18   repeating said sending and receiving by using said subsequent layer-2 device in

19   the place of said present layer-2 device until said response packet indicates that said

20   second system is ~~systemis~~ directly connected to said ~~presently~~ present layer-2 device.

1   2. (Original): The method of claim 1, wherein a receiving device receives said

2   command, and wherein said receiving device is not directly connected to said first layer-2

3   device, wherein said determining further comprises:

4   locating a directly connected device which is connected directly to said first

5   system;

6   using said directly connected device as said present layer-2 device; and

7   performing said repeating to determine said route.

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

1   3. (Original): The method of claim 2, wherein said locating comprises:

2   substituting said receiving device as said first layer-2 device; and

3   performing said repeating to determine said directly connected device.

1   4. (Currently Amended): The method of claim 2, wherein said locating comprises

2   sending a multicast packet directed to said plurality of devices, said multicast packet

3   containing an identifier of said ~~source~~ first system, wherein each of said plurality of

4   devices is designed to respond indicating if said ~~source~~ first system is connected directly

5   to the device.

1   5. (Original): The method of claim 1, wherein said determining, sending,

2   receiving, and repeating are performed in a receiving device.

1   6. (Original): The method of claim 5, further comprising providing a command

2   line interface to enable a network administrator to enter said command on said receiving

3   device.

1   7. (Currently Amended): The method of claim 1, wherein said second system is

2   deemed to be directly connected to said first layer-2 device if said second system is

3   connected to a port of said first layer-2 device.

1   8. (Original): The method of claim 7, further comprising:

2   receiving in said receiving device a neighbor packet from a neighbor device on at

3   least one port; and

4   concluding in said receiving device that a system communicating on another port

5   is connected directly to said another port by the absence of reception of neighbor packets

6   on said another port.

1   9. (Original): The method of claim 8, wherein said network is implemented using

Page 6 of 23

2   Ethernet/802.3 protocol.

1   10. (Original): The method of claim 1, wherein said request packet and said

2   response packet are generated consistent with UDP/IP protocol.

1   11. (Original): The method of claim 1, wherein said determining, sending,

2   receiving, and repeating are performed in a computer system.

1   12. (Currently Amended): A method of supporting the tracing of a route

2   containing a sequence of layer-2 devices between a first system and a second system, said

3   method being performed in a device forming a part of a network, said method comprising:

4   receiving in said device a request packet containing an identifier for said second

5   system, wherein said request packet requests information on whether said second system

6   is connected directly to said device;

7   determining in said device whether said device is connected directly to said ~~second~~

8   system;

9   generating in said device a response packet, wherein said response packet indicates

10   whether said ~~device~~ second system is connected directly to said device; and

11   sending from said device said response packet.

1   13. (Currently Amended): The method of claim 12, wherein said generating

2   further comprises:

3   ~~idenfifying~~ identifying in said device a next device, wherein said next device is

4   next to said device in a route from said ~~source~~ first system to said ~~destination~~ second

5   system; and

6   including data identifying said next device in said response packet.

1   14. (Currently Amended): The method of claim 13, wherein said identifying

2   comprises:

3   examining a table in said device to determine a port on which said ~~destination~~

Page 7 of 23

4   ~~device~~ second system communicates; and

5   locating a device connecting on said port, wherein said located device comprises

6   said next device.

1   15. (Original): The method of claim 14, wherein said locating comprises:

2   receiving a neighbor packet from said next device on said port indicating a next

3   device identifier identifying said next device; and

4   including said next device identifier in said response packet.

1   16. (Original): The method of claim 15, wherein said first system is deemed to be

2   connected directly to said device if said first system is present on a port of said device,

3   wherein determining is based on the absence of reception of said neighbor packet on said

4   port.

1   17. (Currently Amended): ~~A device/system~~ An apparatus processing a command

2   requesting information on any intermediate layer-2 devices present in a route from a first

3   system to a second system, said any intermediate devices being contained in a network

4   implemented on a broadcast medium, said network containing a plurality of devices

5   including said any intermediate devices, said ~~device/system~~ apparatus comprising:

6   means for receiving said command;

7   means for determining a first layer-2 device which is connected directly to said

8   first system, logically viewing said first layer-2 device as a present layer-2 device if said

9   second system is also not directly connected to said first layer-2 device;

10   means for sending a request packet to said present layer-2 device requesting

11   information on whether said second system is connected directly to said ~~system~~ present

12   layer-2 device;

13   means for receiving a response packet from said present layer-2 device, wherein

14   said response packet indicates whether said second system is connected directly to said

15   present layer-2 device, wherein said response packet further identifies a subsequent layer-

16   2 device in a route to said second system if said second system is not connected directly

Page 8 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

17   to said present layer-2 device, wherein said subsequent layer-2 device is next to said

18   present layer-2 device in said route to said second system; and

19   means for repeating said sending and receiving by using said subsequent layer-2

20   device in the place of said present layer-2 device until said response packet indicates that

21   said second system is directly connected to said ~~presently~~ present layer-2 device.

1   18. (Currently Amended): The ~~system/device~~ apparatus of claim 17, wherein a

2   receiving device receives said command, and wherein said receiving device is not directly

3   connected to said first layer-2 device, wherein said means for determining further

4   comprises:

5   means for locating a directly connected device which is connected directly to said

6   first system;

7   means for using said directly connected device as said present layer-2 device; and

8   performing said repeating to determine said route.

1   19. (Currently Amended): The ~~system/device~~ apparatus of claim 18, wherein said

2   means for locating comprises:

3   means for substituting said receiving device as said first layer-2 device; and

4   means for performing said repeating to determine said directly connected device.

1   20. (Currently Amended): The ~~system/device~~ apparatus of claim 18, wherein said

2   means for locating comprises sending a multicast packet directed to said plurality of

3   devices, said multicast packet containing an identifier of said ~~source~~ first system, wherein

4   each of said plurality of devices is designed to respond indicating if said ~~source~~ first

5   system is connected directly to the device.

1   21.   (Currently Amended): A device for supporting the tracing of a route

2   containing a sequence of layer-2 devices between a first system and a second system, said

3   device being comprised in a network based on broadcast medium, said device comprising:

4   means for receiving in said device a request packet containing an identifier for said

Page 9 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

5   second system, wherein said request packet requests information on whether said second

6   system is connected directly to said device;

7   means for determining in said device whether said device is connected directly to

8   said second system;

9   means for generating in said device a response packet, wherein said response

10   packet indicates whether said ~~device~~ second system is connected directly to said device;

11   and

12   means for sending from said device said response packet.

1   22.   (Currently Amended): The device of claim 21, wherein said means for

2   generating further comprises:

3   means for identifying in said device a next device, wherein said next device is next

4   to said device in a route from said ~~source~~ first system to said ~~destination~~ second system;

5   and

6   means for including data identifying said next device in said response packet.

1   23.   (Currently Amended): The device of claim 22, wherein said means for

2   identifying comprises:

3   means for examining a table in said device to determine a port on which said

4   ~~destination device~~ second system communicates; and

5   means for locating a device connecting on said port, wherein said located device

6   comprises said next device.

1   24. (Original): The device of claim 23, wherein said means for locating comprises:

2   means for receiving a neighbor packet from said next device on said port indicating

3   a next device identifier identifying said next device; and

4   means for including said next device identifier in said response packet.

1   25. (Original): The device of claim 23, wherein said first system is deemed to be

2   connected directly to said device if said first system is present on a port of said device,

Page 10 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

3   wherein determining is based on the absence of reception of said neighbor packet on said

4   port.

5   26.   (Currently Amended): A computer readable medium carrying one or more

6   sequences of instructions for causing a device to process a command requesting

7   information on any intermediate layer-2 devices present in a route from a first system to

8   a second system, said any intermediate devices being contained in a network implemented

9   on a broadcast medium, said network containing a plurality of devices including said any

10   intermediate devices, wherein execution of said one or more sequences of instructions by

11   one or more processors contained in said device causes said one or more processors to

12   perform the actions of:

13   receiving said command;

14   determining a first layer-2 device which is connected directly to said first system,

15   logically viewing said first layer-2 device as a present layer-2 device if said second

16   system is also not directly connected to said first layer-2 device;

17   , sending a request packet to said present layer-2 device requesting information on

18   whether said second system is connected directly to said ~~system~~ present layer-2 device;

19   receiving a response packet from said present layer-2 device, wherein said

20   response packet indicates whether said second system is connected directly to said

21   present layer-2 device, wherein said response packet further identifies a subsequent layer-

22   2 device in a route to said second system if said second system is not connected directly

23   to said present layer-2 device, wherein said subsequent layer-2 device is next to said

24   present layer-2 device in said route to said second system; and

25   repeating said sending and receiving by using said subsequent layer-2 device in

26   the place of said present layer-2 device until said response packet indicates that said

27   second system is directly connected to said ~~presently~~ present layer-2 device.

1   27.   (Original): The computer readable medium of claim 26, wherein said

2   command is received in a receiving device, wherein said receiving device is not directly

3   connected to said first layer-2 device, wherein said determining further comprises:

Page 11 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

4   locating a directly connected device which is connected directly to said first

5   system;

6   using said directly connected device as said present layer-2 device; and

7   second performing said repeating.

1   28. (Original): The computer readable medium of claim 27, wherein said locating

2   comprises:

3   substituting said receiving device as said first layer-2 device;

4   third performing said repeating;

5   using a last one of said present-layer 2 determined by said third performing as said

6   directly connected device.

1   29. (Currently Amended): The computer readable medium of claim 27, wherein

2   said locating comprises sending a multicast packet directed to said plurality of devices,

3   said multicast packet containing an identifier of said ~~source~~ first system, wherein each of

4   said plurality of devices is designed to respond indicating if said ~~source~~ first system is

5   connected directly to the device.

1   30. (Original): The computer readable medium of claim 26, wherein said

2   determining, sending, receiving, and repeating are performed in said receiving device.

1   31. (Original): The computer readable medium of claim 30, further comprising

2   providing a command line interface to enable a network administrator to enter said

3   command on said receiving device.

1   32. (Currently Amended): The computer readable medium of claim 26, wherein

2   said second system is deemed to be directly connected to said first layer-2 device if said

3   second system is connected to a port of said first layer-2 device.

1   33. (Original): The computer readable medium of claim 32, further comprising:

Page 12 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

2   receiving in said receiving device a neighbor packet from a neighbor device on at

3   least one port; and

4   concluding in said receiving device that a system communicating on another port

5   is connected directly to said another port by the absence of reception of neighbor packets

6   on said another port.

1   34. (Original): The computer readable medium of claim 33, wherein said network

2   is implemented using Ethernet/802.3 protocol and said request packet and said response

3   packet are generated consistent with UDP/IP protocol.

1   35. (Currently Amended): A computer readable medium carrying one or more

2   sequences of instructions for causing a device to support the tracing of a route containing

3   a sequence of layer-2 devices between a first system and a second system, said device

4   being comprised in a network based on broadcast medium, wherein execution of said one

5   or more sequences of instructions by one or more processors contained in said device

6   causes said one or more processors to perform the actions of:

7   receiving in said device a request packet containing an identifier for said second

8   system, wherein said request packet requests information on whether said second system

9   is connected directly to said device;

10   determining in said device whether said device is connected directly to said <u>second</u>

11   system;

12   generating in said device a response packet, wherein said response packet indicates

13   whether said ~~device~~ <u>second system</u> is connected directly to said device; and

14   sending from said device said response packet.

1   36. (Currently Amended): The computer readable medium of claim 35, wherein

2   said generating further comprises:

3   identifying in said device a next device, wherein said next device is next to said

4   device in a route from said ~~source~~ <u>first</u> system to said ~~destination~~ <u>second</u> system; and

5   including data identifying said next device in said response packet.

Page 13 of 23

1   37. (Currently Amended): The computer readable medium of claim 36, wherein

2   said identifying comprises:

3   examining a table in said device to determine a port on which said ~~destination~~

4   ~~device~~ second system communicates; and

5   locating a device connecting on said port, wherein said located device comprises

6   said next device.

1   38. (Original): The computer readable medium of claim 37, wherein said locating

2   comprises:

3   receiving a neighbor packet from said next device on said port indicating a next

4   device identifier identifying said next device; and

5   including said next device identifier in said response packet.

1   39.   (Currently Amended): A device for supporting the tracing of a route

2   containing a sequence of layer-2 devices between a first system and a second system, said

3   device being comprised in a network based on broadcast medium, said device comprising:

4   an inbound interface receiving a request packet containing an identifier for said

5   second system, wherein said request packet requests information on whether said second

6   system is connected directly to said device;

7   a next hop block determining whether said device is connected directly to said

8   second system;

9   a generate request/response block generating a response packet, wherein said

10   response packet indicates whether said ~~device~~ second system is connected directly to said

11   device; and

12   an outbound interface sending said response packet.

1   40. (Original): The device of claim 39, further comprising:

2   a memory storing a first table and a second table, said first table indicating a port

3   on which each system communicates, said second table indicating a device connecting

Page 14 of 23

Reply to Office Action of June 18, 2004   Appl. No.: 09/824,844
Amendment Dated: September 14, 2004   Attorney Docket No.: CSCO-007/3484

4   to each port; and

5   a port determination block determining a port on which said second system

6   communicates,

7   wherein said next hop block examines said second table to determine said a next

8   device according to the port determined by said port determination block, wherein said

9   next device is contained in said sequence of layer-2 devices.

1   41. (Original): The device of claim 40, wherein said next hop block determines

2   that said second system is directly connected to a first port indicated by said first table

3   if no device is associated with said first port in said second table.

1   42. (Original): The device of claim 39, further comprising an user interface

2   receiving said a trace command from a network administrator.

1   43. (Original): The device of claim 42, wherein said device is not directly

2   connected to said first system, said device further comprising a control logic to trace a

3   directly connecting device connecting directly to said first system, wherein said route is

4   traced from said directly connecting device using said inbound interface, said outbound

5   interface, said next hop block and said generate request/response block.

1   44. (Original): The device of claim 42, wherein said device is not directly

2   connected to said first system, said device further comprising a control logic to trace a

3   directly connecting device connecting directly to said first system by sending a multicast

4   packet.

1   45. (Original): The device of claim 39, further comprising a response processor

2   to receive a response packet, wherein said response packet indicates a next device in said

3   route, wherein said generate request/response block generates another request packet

4   directed to said next device, wherein said another request packet requests said next device

5   to indicate whether said second system is connected directly to said next device.

Page 15 of 23